FORM PTO-1390
REV. 5-93

US DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEYS DOCKET NUMBER
P00,1973

U.S.APPLICATION NO. (if known, see 37 CFR 1.5)
09/763096

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE99/02390	2 August 1999	17 August 1998

TITLE OF INVENTION
"ERROR DETECTION IN A COMMUNICATION DEVICE"

APPLICANT(S) FOR DO/EO/US
Horst SANDER, Rudolf STELZL and Richard WALDHAUSER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2).

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).)

10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C.371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report).**

12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.
    (SEE ATTACHED ENVELOPE)

13. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☐ A substitute specification.

15. ☐ A change of power of attorney and/or address letter.

16. ☒ Other items or information:
    a. ☒ Request for Approval of Drawing Changes
    b. ☒ **EXPRESS MAIL #EL 655300920US, dated February 15, 2001.**

U.S.APPLICATION NO. (if known, see 37 C.F.R. 1.5) 09/763096	INTERNATIONAL APPLICATION NO. PCT/DE99/02390	ATTORNEY'S DOCKET NUMBER P00,1973

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO . . . . . $860.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) . . $700.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) . . . . . $770.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO . . . . . $1040.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) . . . . . $ 96.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	11 - 20 =		X $ 18.00	$ .00	
Independent Claims	2 - 3 =	1	X $ 80.00	$	
Multiple Dependent Claims			$270.00 +	$	
TOTAL OF ABOVE CALCULATIONS =				$ 860.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)				$	
SUBTOTAL =				$ 860.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$ 860.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +					
TOTAL FEES ENCLOSED =				$ 860.00	
				Amount to be refunded	$
				charged	$

a. ☒ A check in the amount of $ 860.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 501519. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Schiff Hardin & Waite
Patent Department
6600 Sears Tower
Chicago, Illinois 60606

Steven H. Noll
SIGNATURE

Steven H. Noll
NAME

28,982
Registration Number

IN THE UNITED STATES ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

"PRELIMINARY AMENDMENT"

APPLICANT: Horst SANDER et al.

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE99/02390

INTERNATIONAL FILING DATE: 2 August 1999

INVENTION: ERROR DETECTION IN A COMMUNICATION DEVICE

Hon. Assistant Commissioner for Patents
Box PCT
Washington D.C. 20231

SIR:

Amend the above-identified international application before entry into the national stage before the U.S. Patent & Trademark Office under 35 U.S.C. §371 as follows:

IN THE SPECIFICATION

On page 1, after line 1, insert --

TITLE--;

in line 2, before "Error" insert --A Method and Switching Device For--;

after the title, insert --

BACKGROUND OF THE INVENTION

Field of the Invention--;

in line 4, delete "determining [or:" and change "detecting]" to --detecting--;

in line 9, replace "means" with --device--;

in line 14, delete "trigger [or:" and delete ", release";

after line 15, insert --

Description of the Related Art--; and

in line 26, delete "respectively,".

On page 3, in line 12, replace "means" with --devices--;

in line 13, delete "respectively,";

in line 14, replace "means" with --apparatus--; and

in line 16, replace "means" with --devices--.

On page 4, after line 7, insert --

SUMMARY OF THE INVENTION--;

in line 10, replace "means" with --apparatus--;

in line 13, replace "means" with --device--;

delete lines 17-19; and

in line 21, after "method" insert --of the present invention-- and replace "means" with --device--.

On page 5, in line 14, delete ", respectively,";

in line 16, delete "[or: borders, limits]";

in line 18, replace "means" with --apparatus--;

in line 20, delete "means of" and insert --utilizing--, before "inventive"

insert --present-- and delete "and having any cause can" and insert --leading--;

in line 21, delete "be determined that lead"; and

in line 28, delete "As a reaction to the determination of a switching-internal error" and insert --Once a switching-internal error is determined--.

On page 6, in line 5, replace "said" with --this--;

in line 6, replace "means" (both occurrences) with --device--; and

in line 8, replace "means" with --device--.

On page 7, in line 14, replace "means" with --device--;

in line 15, replace "means" with --device--;

in line 17, delete "behind [or: after]" and insert --before-- and replace "means" with --apparatus--;

in line 18, replace "means" with --device--;

in lines 23 and 24, delete "switching-internal partial paths can be monitored by all active communication connections [or:";

in line 26, change "monitored]" to --monitored--; and

in line 27, delete "respectively,".

On page 8, in line 4, delete "respectively," and replace "means" with --device--;

in lines 5-7, delete "[translator's note: the German is grammatically unclear as to whether the switching means or the peripheral assembly is located at the end of the path]" and insert --.--;

in line 10, delete "a preferred development" insert --another embodiment--;

in line 12, delete "respectively";

in line 14, delete "respectively";

in line 17, delete "respectively,"; and

in line 25, replace "means" with --device--.

On page 9, in lines 1-3, delete "Apparatus features that can be learned from the above specification of the inventive method and its developments are inventively essential for the inventive switching means or, respectively, its developments.";

in line 4, replace "means" with --apparatus--;

in line 6, delete "[or: is subsequent]";

in lines 12-15, delete "The invention is now specified in more detail on the basis of exemplary embodiments. However, it is not limited to these exemplary embodiments. In the specification of the exemplary embodiments, reference is made to the attached drawing. The single figure of the drawing, designated Figure 1, shows:";

after line 15, insert --

BRIEF DESCRIPTION OF THE DRAWING--;

in line 17, before "a monitoring" insert --The Figure shows--, replace "means" with --device and its peripheral assemblies-- and replace "is" with --are--;

delete lines 18-21, and insert --signalized subscriber connection at a network node--;

in line 22, replace "means" with --apparatus--;

in line 24, delete "respectively,"; and

in line 25, replace "means" with --device--.

On page 10, in line 3, delete "respectively";

in line 10, delete "respectively,"; and

in line 18, delete "respectively,".

On page 11, in lines 7 and 8, delete "[or: communication signals fro the output-side external transmission path 9 are absent]";

in line 14, delete "respectively";

in line 21, delete "respectively,"; and

in line 28, delete "respectively,".

On page 12, in line 8, delete "above specification part" and insert --as previously discussed--; and

in line 9, delete "[sic]" and delete "respectively,".

On page 13, in line 9, delete "respectively,".

On page 14, in line 1, replace "means" with --apparatus-- and change "Figure 1" with --the figure--;

in lines 5 and 6, delete "As already mentioned, the invention is not limited to the previously specified exemplary embodiments. Thus, it" and insert --It--; and

after line 19, add the following new paragraph --

Although other modifications and changes may be suggested by those skilled in the art, it is the intention of the inventors to embody within the patent warranted hereon all changes and modifications as reasonably and properly come within the scope of their contribution to the art.--.

IN THE DRAWINGS

Please amend the drawing per the enclosed Request for Approval of Drawing Changes.

IN THE CLAIMS

On Amended Page 15, line 1, change "New patent claims" to --We Claim:--.

Please cancel all claims without prejudice and add new claims 12- 22 as follows:

12. A method for determining errors of a communication system, comprising the steps of:

feeding monitoring signals at a beginning of at least one monitoring path of a communication system;

coupling out said monitoring signals at an end of said at least one monitoring path, said at least one monitoring path being located inside a switching device of said communication system, said at least one monitoring path one of being extended up to boundaries of said switching device and being connected with external paths to a communication line; and

determining a presence of an error inside said switching device given an absence of all signals at the end of said at least one monitoring path.

13. A method according to claim 12, further comprising the step of:

feeding switching-internal monitoring signals at a first line interface located between said switching device and one of said external paths, said one of said external paths arranged before said switching device.

14. A method according to claim 12, further comprising:
coupling out said switching-internal monitoring signals at a second line interface located between said switching device and one of said external paths of said communication line, said one of said external paths being arranged after said switching device in a direction of said switching-internal monitoring signals' flow.

15. A method according to claim 14, further comprising the step of:
stopping a time interval measurement upon absence of all signals at the end of the said at least one monitoring path, said time interval measurement being utilized for a determination of fees, said fees being dependent on a connection duration.

16. A method according to claim 14, wherein said feeding step is performed upon no communication signal arriving at the beginning of the at least one monitoring path during a predetermined time span.

17. A method according to claim 16, further comprising the step of:
repeating said feeding step upon no communication signal arriving at the beginning of the at least one monitoring path during a predetermined time span.

18. A method according to claim 12, further comprising the step of:
operating said at least one monitoring path on each of switching-internal connection segments of communication connections that transmit signal, said each of switching-internal connection segments interfacing via a line link with external connection segments at one of a beginning and an end of said each of switching-internal connection segments.

19. A method according to claim 12, wherein said at least one monitoring path is at least part of a signalized communication connection and a signalized permanent communication connection.

20. A switching device for switching communication connections of a communication system comprising:

a feed-in unit in order to feed monitoring signals in to a communication system given an absence of communication signals via an active communication connection, said feed-in unit being arranged on a switching-internal monitoring path of a common communication connection, said switching-internal monitoring path one of extending up to boundaries of said switching device and being connected with external connections via partial paths of said switching device,

a coupling-out unit in order to couple out monitoring signals form said active communication connection, said coupling-out unit also to trigger an error message given an absence of all signals, said coupling-out unit being arranged on said switching-internal monitoring path of said common communication connection,

said switching-internal monitoring path being one of extending up to boundaries of said switching device and being connected with external connections via partial paths of said switching device,

said feed-in unit being located at a beginning of said switching-internal monitoring path,

said coupling out unit being located at an end of said switching-internal monitoring path,

said coupling-out unit being fashioned so as to recognize and to couple out monitoring signals fed in by said feed-in unit.

21. A switching device according to claim 20, wherein said feed-in unit is arranged at a first line interface at which a first external connection segment is connected to a following switching-internal monitoring path in a direction of signal flow.

22. A switching device according to claim 20, wherein said coupling-out unit is arranged at a second line interface at which a second external connection segment is connected to a following switching-internal monitoring path in a direction of signal flow.

IN THE ABSTRACT

Change "Abstract" to --Abstract of the Disclosure--;

delete "Error determination in a communication system";

in line 4, delete "The invention relates to" and replace "a" with --A--;

in line 5, delete "whereby, given an" and insert --wherein--;

in line 6, after "signals" insert --at the end of a monitoring path-- and delete "at least";

delete line 7, and replace with --monitoring path of the communication system. These monitoring signals are coupled out again at the end--;

delete line 8, and replace with --of the monitoring path. The monitoring path is located--;

in line 9, delete "means (1)" and insert --device--;

in line 10, delete "(7, 8),";

in line 11, delete "means (1)", first occurrence, and insert --device-- and delete "means (1)" and insert --apparatus--;

in line 12, delete "(7, 8) at whose beginning" and insert --with and delete "(2) is";

delete line 13, and replace with --and a coupling-out unit. The feed-in unit is located at the beginning of the monitoring path and the coupling unit is arranged at the end of the monitoring path. The coupling-out unit--;

in line 14, delete "(3)";

delete line 15, and replace with --unit. The invention can further trigger an AIS (Alarm--;

in line 17, delete "means (1)" and insert --device--; and

and delete the last line, "Figure 1".

REMARKS

The foregoing amendments to the specification and claims under Article 41 of the Patent Cooperation Treaty place the application into a form for prosecution before the U.S. Patent and Trademark Office under 35 U.S.C. §371. Accordingly, entry of these amendments before examination on the merits is hereby requested.

Respectfully submitted,

Steven H. Noll

Steven H. Noll (reg. no. 28,982)
Schiff Hardin & Waite
Patent Department
6600 Sears Tower
Chicago, Illinois 60606
Telephone: 312-258-5785
CUSTOMER NO. 26574

ATTORNEY FOR APPLICANT

IN THE UNITED STATES ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

"**REQUEST FOR APPROVAL OF DRAWING CHANGES**"

APPLICANT: Horst SANDER et al.

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE99/02390

INTERNATIONAL FILING DATE: 2 August 1999

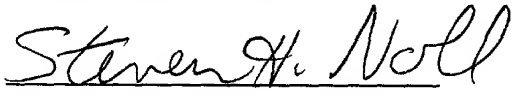
INVENTION: ERROR DETECTION IN A COMMUNICATION DEVICE

Hon. Assistant Commissioner for Patents
Box PCT
Washington D.C. 20231

SIR:

Applicants herewith request approval of the drawing changes in Figure 1, as shown on the drawing copy marked in red attached hereto.

Respectfully submitted,



Steven H. Noll (reg. no. 28,982)
Schiff Hardin & Waite
Patent Department
6600 Sears Tower
Chicago, Illinois 60606
Telephone: 312-258-5790

ATTORNEY FOR APPLICANT

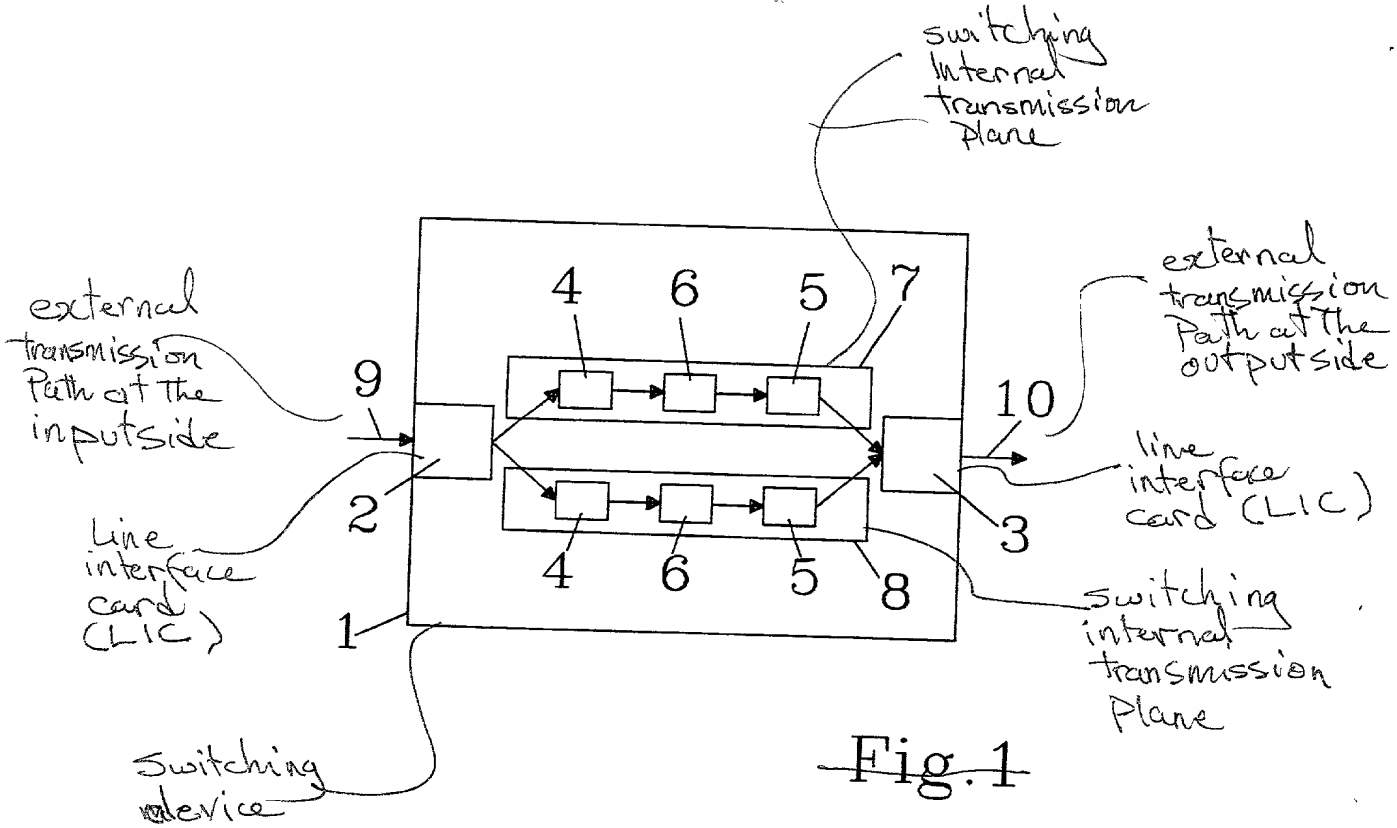

switching internal transmission plane
external transmission Path at the inputside
external transmission Path at the outputside
4
6
5
7
9
10
line interface card (LIC)
2
3
Line interface card (LIC)
4
6
5
8
1
switching internal transmission Plane
Switching device

Fig. 1

09/763096
JC02 Rec'd PCT/PTO 15 FEB 2001

Specification

Error determination in a communication system

The invention relates to a method for determining **[or: detecting]** errors of a communication system, in particular an ATM (Asynchronous Transfer Mode) communication system, whereby, given an absence of communication signals, monitoring signals are fed in at the beginning of at least one monitoring path of a communication connection and at the end of the monitoring path these monitoring signals are coupled out again. In addition, the invention relates to a switching means for switching communication connections of a communication system, in particular of an ATM communication system, having a feed-in unit in order, given the absence of communication signals via an active communication connection, to feed the monitoring signals into the communication connection, and having a coupling-out unit in order to couple monitoring signals out from an active communication connection and to trigger **[or: initiate, release]** an error message given an absence of all signals.

From the recommendation of the International Telecommunication Union, Telecommunication Standardization Sector: "Integrated Services Digital Network (ISDN), Maintenance Principles," B-ISDN Operation and Maintenance Principles and Functions I-610 (11/95) – referred to in the following as ITU-T Recommendation I.610 – an ATM communication system is known in which the communication signals are transmitted in what are known as cells. The ATM cells comprise a cell head that contains items of information on the basis of which switching means at network nodes of the ATM communication system recognize on which of a plurality of transmission paths beginning at the network node the respective cell is to be sent. In the ATM communication system, what are known as physical layers and what are known as virtual or, respectively, ATM layers are defined. In the physical layers, ATM cells are transmitted along physical transmission paths with unambiguous cell-independent beginning and end points. The virtual layers respectively comprise the physical layers and, in addition, further elements of the ATM communication system. Within the virtual layers, virtual communication connections are defined, whereby

the ATM cells transmitted via a virtual communication connection are switched at least once at a switching means to the correct transmission path on the basis of their cell head information.

From the ITU-T Recommendation I.610, it is known to monitor permanent virtual connections, which are subject to particularly high demands from the operators with regard to their reliability, as follows: the operator defines, along the permanent virtual connection, a beginning point and an end point of a monitoring path. At the beginning point, which for example is located at the output interface of a switching means and at the beginning of a physical transmission path, monitoring signals, in the form of what are known as CC cells (Continuity Check Cells), are fed into the permanent virtual connection if no ATM cell has arrived at the beginning point for the period of one second. If in addition no ATM cells arrive at the beginning point of the monitoring path, a CC cell is again respectively fed into the permanent virtual connection at intervals of one second. In this way, a cell stream is maintained on the monitoring path even if no ATM cells arrive at the beginning point of the monitoring path. Given an absence of all cells at the end point of the monitoring path, the presence of an error in the permanent virtual connection can consequently be inferred. If such an error is determined, an AIS signal (Alarm Indication Signal) is fed into the permanent virtual connection forwards in the direction of signal flow. In addition, the operator is informed of the presence of the error by an alarm message. Such alarm messages are in particular used in the calculation of fees that are dependent on connection duration, in order to determine later, in a subsequent processing, the times at which a permanent virtual connection was not available.

Besides permanent virtual connections, signalized virtual connections, which are set up in response to the request of a user of the communication system, are also known in ATM communication systems. Again at the request of the user or of another participant in the connection, the signalized connection is interrupted, for example by hanging up a telephone handset. In the ITU-T Recommendation I.610, no corresponding monitoring method, as for a permanent virtual connection, is proposed. On one hand, significantly lower demands with respect to reliability are placed on signalized virtual connections, and on the other hand the

outlay for the setting up of monitoring paths at the respective beginning of a signalized virtual connection is relatively high, and often does not stand in a proportionate relation to the duration of the connection or, respectively, to the expense for the creation of a new connection between the same subscribers, should such a signalized connection be interrupted. Should a monitoring such as that specified above for permanent virtual connections nonetheless be desired for a signalized connection, the subscriber or the operator of the communication system would either have to wait and see which physical transmission paths were selected by the communication system during the setup of the virtual connection, or the subscriber or the operator would have to limit the selection possibilities of the communication system, which can lead to ineffective management in the switching of connections.

It is known to provide, in an ATM communication system, switching means that switch communication connections or, respectively, that set chains of physical transmission paths for the respective communication connections. In particular, switching means are known that comprise a central switching computer that respectively controls a multiplicity of peripheral assemblies. However, switching means are also known in which the control function is taken over by the peripheral assemblies themselves or by a computer external to the switching.

For example, switching-external physical transmission paths are connected with an interface in an interface assembly LIC (Line Interface Card). The LIC forwards incoming ATM cells, via a first multiplexer assembly AMX (ATM Multiplexing Unit), a coupling field assembly ASN (ATM Switching Network), and a second multiplexer assembly AMX, to an output-side interface at an output-side second interface assembly LIC. In the operation of these peripheral assemblies, hardware errors and software errors may occur that lead to the collapse of a virtual communication connection. In general, the Bellcore Specification GR-1248-Core Issue 2, ch. 6.1.2. (September 1995 edition) requires that, given an interruption of a virtual connection, within 500 milliseconds after the interruption has been determined an error signal must be fed into the virtual connection. As error signals, the already-cited AIS (Alarm Indication Signal) in the forward direction of the virtual connection, and the RDI (Remote Defect Indication) in the backward direction of the virtual connection, are known.

Given a failure of one or more peripheral assemblies of a switching means with a central control computer of the type described above, it is known that the presence of the error is first signaled to the associated central control computer. The control computer thereupon determines which virtual connection or connections are affected, and informs the associated affected interface assemblies LIC. In response to the message from the control computer, the LICs feed the required signals AIS and RDI into the virtual connection. According to this method, the requirement stated above – of the feeding of the error signal or signals within 500 milliseconds after determination of the error – cannot be met.

The object of the present invention is to indicate a method of the type named above that makes it possible, in well-directed fashion, to determine errors in a switching means of the communication system and to feed an error signal into a communication connection in the shortest possible time after determination of the error. A further object of the invention is to indicate a switching means for switching communication connections of a communication system of the type named above that allows the rapid error determination and feeding of the error signal.

The objects are achieved by a method having the features of claim 1 or, respectively, by a switching means having the features of claim 9. Developments are the subject matter of the respective dependent claims.

With respect to the method, in the switching means of the communication system at least one monitoring path is set up, at the beginning of which, given the absence of communication signals, monitoring signals are fed in and are coupled out again at the end of the monitoring path. A monitoring path is understood to be a physical or virtual transmission path for the transmission of communication signals. The monitoring path can thereby be a part of one or more communication connections. These communication connections may be not only permanent virtual connections, but also signalized subscriber connections, system-internal connections for the transmission of organizational information, and/or signalized permanent virtual connections (SPVC), which the operator or user of the communication system sets up in a particularly simple fashion, and which are handled by the communication system, at least

in part, in the same way as are signalized connections. The monitoring path is not dependent on the type of communication connections that are connected or can be connected thereto. Rather, it is also possible – for example, in order to check the switching means for proper functioning – to operate the monitoring path without connected communication connections, or only given non-activated communication connections, so that in any case no communication signals arrive at the beginning of the monitoring path. Thus, at least one monitoring signal is fed in via the monitoring path. If the monitoring signal arrives at the end of the monitoring path, at least the capacity of the monitoring path to transmit signals is confirmed.

Communication signals are understood to be any signals that can arrive at the beginning of the monitoring path. For example, these can be user signals transmitted by users of the communication system via a communication connection, or organizational information transmitted between mutually remote components of the communication system. A switching-internal monitoring path, or, respectively, a monitoring path located inside a switching means of the communication system, is understood to be a monitoring path that can extend up to the boundaries **[or: borders, limits]** of the switching means, or that is connected with interfaces to external transmission paths only via other partial paths of the switching means.

By means of the inventive monitoring method, errors of any type and having any cause can be determined that lead to an absence of all signals at the end of the monitoring path. The absence of all signals is understood as the arrival of no signal in its expected form at the end of the monitoring path. This includes the case in which, for example, only garbled signals arrive, or signals whose type and format can no longer be recognized, for example, ATM cells having a damaged cell head. Another example is provided by hardware errors that lead to an interruption of the monitoring path.

As a reaction to the determination of a switching-internal error, for example an error diagnosis is made and, after locating a hardware error, a redundant unit is placed into

operation in place of the faulty unit. This takes place for example within a few milliseconds. The cause of a connection failure may also be a software error.

The inventive monitoring method can also be executed simultaneously with the method known from ITU-T Recommendation I.610. For example, in a known manner a first monitoring path is set up on a permanent virtual connection, said path having its beginning at a first switching means of the communication system and ending at a second switching means remote from the first switching means. In addition, in the example a second inventive monitoring path is set up inside the first switching means. Signals of the permanent virtual connection, among others, can also be transmitted via the inventive monitoring path. The inventive monitoring path thereby forms a partial segment of the previously known monitoring path. If no communication signal arrives at the beginning of the previously known monitoring path via the permanent virtual connection, monitoring signals are transmitted via the previously known monitoring path. These monitoring signals also run through the inventive monitoring path, among others, so that communication signals are transmitted via this path. Only given a failure or clearing down of the permanent virtual communication connection, or after a deactivation of the previously known monitoring path, can it occur that no communication signal is transmitted via the inventive monitoring path. In this case, at least one monitoring signal is fed in at the beginning of the inventive monitoring path.

In contrast to the prior art specified in ITU-T Recommendation I.610, it is in particular possible by monitoring the monitoring path to monitor not only one single permanent virtual connection, but rather to monitor – at least along the monitoring segment – all communication connections using the monitoring path. The setting up of the monitoring path as an active monitoring path for all communication connections running via it preferably takes place automatically, in particular in the setup of the individual communication connections.

In a development, for each active communication connection that runs via the monitoring path, given the absence of all signals of the respective communication connection a

connection-specific monitoring signal is fed in at the beginning of the monitoring path. Connection-specific errors on the monitoring path can thereby be recognized, which for example do not affect the other communication connections, so that only the one communication connection has failed. Hardware errors and/or software errors may be involved here.

Given a presence of at least one bidirectional communication connection connected to the inventive monitoring path, a monitoring is preferably carried out, likewise in an inventive manner, in the opposite direction, that is, between the end point of the monitoring path and the beginning point of the monitoring path.

In a preferred construction of the inventive method, the switching-internal monitoring signals are fed in at a first line interface, between an external path of a communication line – which path is arranged, or can be arranged, before the switching means in the direction in which the signal runs – and the switching means. Alternatively, or in addition, the switching-internal monitoring signals are coupled out at a second line interface, between the switching means and an external path of a communication line – which path is arranged, or can be arranged, behind **[or: after]** the switching means in the direction in which the signal runs. In this way, the switching means can be monitored up to its outer boundary or boundaries. In a variant, the monitoring signals are fed in and/or coupled out at a different peripheral assembly, for example a coupling field assembly. A particularly preferred construction is one in which at least one connection-internal monitoring path is respectively operated on all switching-internal connection segments of communication connections that end and/or begin at line interfaces to external connection segments and that transmit signals. In this way, switching-internal partial paths can be monitored by all active communication connections **[or: switching-internal partial paths of all active communication connections can be monitored]**. It is thus also not necessary for the operator or a user of the communication system expressly to request or, respectively, set up the monitoring paths in a connection setup. The setting up of the respective monitoring path preferably takes place automatically by means of the communication system.

It is known to carry out time interval measurements in order to determine fees that are dependent on the duration of a connection. In a development of the inventive method, given the absence of all signals at the end of the switching-internal monitoring path, such a time interval measurement is stopped. An associated counter is preferably provided immediately at, or, respectively, on, a peripheral assembly of the switching means that is arranged at the end of the monitoring path **[translator's note: the German is grammatically unclear as to whether the switching means or the peripheral assembly is located at the end of the path]**. A subsequent processing in the calculation of fees in order to determine failure times afterwards can thus be omitted.

In a preferred development, a monitoring signal is fed in if no communication signal arrives at the beginning of the monitoring path during a time interval of predetermined length. In particular, the feeding in of a monitoring signal is respectively repeated if in another time span of the predetermined length no communication signal has arrived. It is thereby ensured that a communication signal or, respectively, monitoring signal is respectively given onto the monitoring path upon expiration of a time period of the predetermined length at the latest. Correspondingly, the presence of an error inside the switching means is inferred if, in a time period of predetermined length, no communication signal or, respectively, monitoring signal has arrived at the end of the monitoring path. The predetermined length in the error determination is either set to a value significantly greater than the predetermined length for the feeding in of monitoring signals at the beginning of the monitoring path, or it is set to approximately the same value, whereby however a small reaction and execution time, which is mainly negligible, for the feeding in of monitoring signals at the beginning of the monitoring path must be taken into account.

As for the apparatus, a switching means of a communication system, in particular of an ATM communication system, is proposed that is characterized in that the feeding-in unit and the coupling-out unit are arranged on a switching-internal monitoring path of a common communication connection, whereby the feeding-in unit is located at the beginning of the monitoring path and the coupling-out unit is located at the end of the monitoring path. The coupling-out unit is thereby fashioned in such a way that it recognizes and couples out

monitoring signals fed in by the feeding-in unit. Apparatus features that can be learned from the above specification of the inventive method and its developments are inventively essential for the inventive switching means or, respectively, its developments.

In particular, in a development of the switching means the feeding-in unit is arranged at a first line interface, at which a first external connection segment of a communication connection can be connected to the switching-internal monitoring path that follows **[or: is subsequent]** in the direction of signal flow, and/or the coupling-out unit is arranged at a second line interface at which the switching-internal monitoring path can be connected to a second external connection segment, which follows in the direction of signal flow, of a communication connection.

The invention is now specified in more detail on the basis of exemplary embodiments. However, it is not limited to these exemplary embodiments. In the specification of the exemplary embodiments, reference is made to the attached drawing. The single figure of the drawing, designated Figure 1, shows:

a monitoring path inside a switching means that is connected to external partial paths of a signalized subscriber connection **[note: the German is grammatically unclear as to whether the path or the means is so connected]**.

Figure 1 schematically shows peripheral assemblies of a switching means 1 at a network node of an ATM (Asynchronous Transfer Mode) communication system. At the switching means 1, at the input side and at the output side a multiplicity of transmission paths can respectively be connected for the transmission of communication signals to or, respectively, from the switching means 1. For the sake of clarity, only the external transmission path 9 at the input side and the external transmission path 10 at the output side are shown, which are respectively partial paths of an active signalized subscriber connection. The external transmission path 9 at the input side ends at an interface assembly LIC (Line Interface Card) 2 in the switching means 1. From there, the active signalized subscriber connection is

continued, via two redundant switching-internal transmission planes 7, 8, up to a second interface assembly LIC, at which the output-side external transmission path 10 begins.

Apart from their beginning and end points at the first LIC 2 or, respectively, at the second LIC 3, the first transmission plane 7 and the second transmission plane 8 have no common connection via which communication signals of the signalized subscriber connection could be transmitted between them. The first transmission plane 7 and the second transmission plane 8 each comprise peripheral assemblies of the switching means 1 that are respectively located one after the other in the direction of signal flow and are connected with one another. Seen from the first LIC 2, the redundant copy, supplied to the first transmission plane 7 or, respectively, to the second transmission plane 8, of a communication signal to be transmitted first arrives at the first multiplexer assembly AMX (ATM Multiplexing Unit) 4. From there, the communication signals are forwarded to a coupling field assembly ASN (ATM Switching Network) 6, and, at an output-side connection of the ASN 6, are coupled to a second multiplexer assembly AMX 5. From the second AMX 5, the redundant copies of the communication signal are again combined in that they are given to the common second LIC 3.

The above specification holds for the error-free or, respectively, undisturbed operating state of the monitoring path between the first LIC 2 and the second LIC 3. During operation, however, it may happen that one or both transmission planes 7, 8 fail. If only one of the transmission planes 7, 8 fails, the transmission path between the first LIC 2 and the second LIC 3 is nonetheless fully capable of functioning, because it is sufficient if one copy of the two redundant communication signals arrives at the second LIC 3. In addition, the first LIC 2 and the second LIC 3 may themselves be disturbed. Under some circumstances, this has the result that only one copy, or no copy, of a communication signal to be transmitted is given to the transmission planes 7, 8. Moreover, it is possible that another component of the switching means 1, for example a central switching computer (not shown), is faulty, so that the transmission of communication signals via a communication path between the first LIC 2 and the second LIC 3 is disturbed. In particular, the communication of connection data from

the central switching computer to one of the LIC 2, 3 can be disturbed. In general, software errors and hardware errors are responsible for the disturbance of the transmission paths.

For the monitoring of the transmission path between the first LIC 2 and the second LIC 3, the first LIC 2 has a feed-in unit in order to send monitoring signals to the second LIC 3 given an absence of communication signals that could arrive at the first LIC 2 via the output-side external transmission path 9. If, in a time span of preferably 500 milliseconds length, communication signals are absent from the output-side external transmission path 9 **[or: communication signals from the output-side external transmission path 9 are absent]**, the first LIC 2 feeds an ATM cell into the communication connection that belongs to the ATM cell type OAM (Operation, Administration, Maintenance). Specifically, this is an iCC cell (internal Continuity Check Cell), whose cell head is provided with a specific identifier. If communication signals or, respectively, ATM cells are respectively absent for an additional 500 milliseconds from the output-side external transmission path 9, the first LIC 2 respectively repeats the sending of an iCC cell. As is also the case for other communication cells that arrive from the output-side external transmission path 9, two copies of the iCC cell are produced, of which one is given to the transmission plane 7 and one is given to the transmission plane 8.

The second LIC 3 comprises a coupling unit that recognizes the iCC cells on the basis of the specific identifier in the cell head and couples them out from the communication connection or, respectively, from the monitoring path between the first LIC 2 and the second LIC 3. In a variant of the exemplary embodiment, the second LIC 3 comprises either two coupling-out units, of which one is allocated to the first transmission plane 7 and one is allocated to the second transmission plane 8, or it comprises a coupling-out unit that recognizes via which of the transmission planes 7, 8 an incoming communication cell arrives at the second LIC 3. In particular, the latter can be enabled in that the redundant copies of communication cells sent by the LIC 2 are provided with different identifiers in the cell head. Preferably, however, the single coupling-out unit – or, respectively, the two coupling-out units – of the second LIC 3 recognizes the transmission plane 7, 8 on the basis of the path via which the respective ATM cell arrives at the second LIC 2. Different cell head identifiers are then superfluous. In the

variants of the exemplary embodiments, it is possible to determine only one of the two redundant transmission planes 7, 8, and for example to initiate an error correction if the transmission of communication signals of the signalized subscriber connection through the other transmission plane 7, 8 functions without error.

In an operational variant of the switching means 1 shown in Figure 1, one of the transmission planes 7, 8 is used as a redundant reserve transmission plane for the case of a disturbance in operation. If, for example, the transmission plane 7 is active, signals are transmitted via this transmission plane. The transmission plane 7 is analogous to the above specification part of the monitoring path [sic]. If, due to a failure, or, respectively, error, in the transmission plane 7 there is an absence of all signals at the end of the monitoring path, a changeover to the redundant transmission plane 8 takes place and operation can be continued, usually without a noticeable interruption. The transmission plane 8 becomes a part of the monitoring path, so that the monitoring function is also maintained.

In the first specified exemplary embodiment, the two copies of a communication signal that are transmitted via the various transmission planes 7, 8 are not distinguished. With this realization, for example the following errors can be determined:

– hardware errors in the first LIC 2 and/or the second LIC 3, whereby for example the entire LIC 2, 3 has failed, or only the interfaces belonging to the monitored communication connection or connections have failed;

– software errors of one of the LIC 2, 3, or of both LIC 2, 3, resulting in an interruption of the communication connections that use the monitoring path as a partial path for the transmission of their communication signals;

– hardware double errors of redundant peripheral assemblies, whereby both assemblies 4, 5, 6 – corresponding respectively to one another with regard to their wiring and function – of the transmission planes 7, 8 are faulty or, respectively, disturbed;

– hardware cross-failures of a respective peripheral assembly of the first transmission plane 7 and of the second transmission plane 8, whereby the two faulty assemblies 4, 5, 6 are not the assemblies 4, 5, 6 that are redundant to one another. For example, a cross-failure of the first AMX 4 of the first transmission plane 7 and of the second AMX of the second transmission

plane 8, or a cross-failure of the ASM of the first transmission plane 7 and of the second AMX 5 of the second transmission plane 8, can be determined.

In general, with this construction all errors can be determined that result in an interruption or, respectively, a failure of the signal transmission via both redundant transmission planes 7, 8.

Preferably, the second LIC 3 comprises a TM unit (Traffic Measurement Unit) that is used for the measurement of the connection duration of one or more communication connections routed via the second LIC 3. Upon connection setup, the TM unit receives a start impulse, so that a corresponding connection duration measurement begins or, respectively, a corresponding connection beginning time is retained. If there is an absence of all communication signals of the communication connection, or, respectively, if no ATM cells allocated to the communication connection arrive at the LIC 3 for more than 500 milliseconds, the TM unit receives a stop impulse from the coupling-out unit or from an additional intermediately connected unit of the second LIC 3, so that the time measurement is terminated or the current time is recorded as the connection end time. Both ways of measuring the connection duration are referred to as time interval measurement.

If, after a failure of the transmission path between the first LIC 2 and the second LIC 3, the second LIC 3 again receives an ATM cell that is allocated to the signalized subscriber connection to be monitored, for example the transmission of AIS (Alarm Indication Signal) cells in the forward direction of the subscriber connection, said transmission having begun after the determination of the error, is stopped, and in the case of connection duration measurement an impulse is given for the resumption of the time interval measurement.

In particular given peripheral assemblies that are able autonomously to maintain a communication connection, the inventive switching-internal monitoring is preferably used exclusively to determine errors of the peripheral assemblies along the monitoring path and their connection among one another. Given the localization of errors, this offers advantages with regard to a rapid determination and removal of errors.

For bidirectional connections, in the switching means 1 shown in Figure 1 a respective monitoring path is preferably set up and operated both from the LIC 2 to the LIC 3 and also in the reverse direction, from the LIC 3 to the LIC 2. Both LIC 2, 3 are thus both feed-in and also coupling-out units for monitoring signals.

As already mentioned, the invention is not limited to the previously specified exemplary embodiments. Thus, it may also be the case that no redundant assemblies are present in the switching means. For example, given an absence of all signals at the end of the monitoring path, AIS cells are then immediately fed in. A further hardware configuration has a bus structure to which the individual peripheral assemblies of the switching means are connected. In this case, upon the arrival of a signal the respective assembly checks whether the signal, in particular the ATM cell, is intended for it. Here as well, at least one monitoring path is set up and operated between two assemblies inside the switching means, in order to monitor at least one communication connection.

By means of the monitoring of a connection-internal monitoring path, failures or, respectively, errors in the switching means can be determined reliably and rapidly, and an error signal, for example an AIS cell, can be sent practically without time delay. In addition, it is possible to determine the connection duration precisely without a subsequent processing, which is otherwise standard.

New patent claims

1. Method for determining errors of a communication system, in particular of an ATM (Asynchronous Transfer Mode) communication system, whereby monitoring signals are fed in at the beginning of at least one monitoring path (7, 8) of the communication system, and are coupled out again at the end of the monitoring path (7, 8),
characterized in that
the monitoring path (7, 8) is located inside a switching means (1) of the communication system, and extends up to its boundaries or is connected with external paths (9, 10) via partial paths of the switching means (1), and by which means, given an absence of all signals at the end of the monitoring path (7, 8), the presence of an error inside the switching means (1) is inferred.

2. Method according to claim 1,
characterized in that
the switching-internal monitoring signals are fed in at a first line interface (2), between the external path (9) of a communication line, which path is arranged or can be arranged before the switching means (1) in the direction of signal flow, and the switching means (1).

3. Method according to claim 1 or 2,
characterized in that
the switching-internal monitoring signals are coupled out at a second line interface (3), between the switching means (1) and the external path (10) of a communication line, which path is arranged or can be arranged after the switching means (1) in the direction of signal flow.

4. Method according to claim 3,
characterized in that
given the absence of all signals at the end of the switching-internal monitoring path (7, 8), a time interval measurement for the determination of fees dependent on connection duration is stopped.

5 Method according to one of claims 1 to 4,
characterized in that
a monitoring signal is fed in if no communication signal has arrived at the beginning of the monitoring path (7, 8) in a time span of predetermined length.

6. Method according to claim 5,
characterized in that
the feeding in of another monitoring signal is respectively repeated if no communication signal has arrived in another time span having the predetermined length.

7. Method according to one of claims 1 to 6,
characterized in that
at least one switching-internal monitoring path (7, 8) is respectively operated on all switching-internal connection segments of communication connections that begin and/or end at line interfaces to external connection segments (9, 10) and that transmit signals.

8. Method according to one of claims 1 to 7,
characterized in that
the monitoring path is a part of a signalized communication connection and/or is a part of a signalized permanent communication connection.

9. Switching means (1) for switching communication connections of a communication system, in particular of an ATM communication system, having
– a feed-in unit (2) in order, given an absence of communication signals via an active communication connection, to feed monitoring signals into the communication connection, and
– a coupling-out unit (3) in order to couple out monitoring signals from an active communication connection and to trigger an error message given an absence of all signals,
characterized in that
the feed-in unit (2) and the coupling-out unit (3) are arranged on a switching-internal monitoring path (7, 8) of a common communication connection, said path extending up to the boundaries of the switching means or being connected with external connection segments (9,

10) via partial paths of the switching means (1), whereby the feed-in unit (2) is located at the beginning of the monitoring path (7, 8) and the coupling-out unit (3) is located at the end of the monitoring path (7, 8), and in that the coupling-out unit (3) is fashioned so as to recognize and to couple out monitoring signals fed in by the feed-in unit (2).

10. Switching means according to claim 9,
characterized in that
the feed-in unit (2) is arranged at a first line interface at which the first external connection segment (9) can be connected to the following switching-internal monitoring path (7, 8) in the direction of signal flow.

11. Switching means according to claim 9 or 10,
characterized in that
the coupling-out unit (3) is arranged at a second line interface at which the switching-internal monitoring path (7, 8) can be connected to the second external connection segment (10) following in the direction of signal flow.

Abstract

Error determination in a communication system

The invention relates to a method for determining errors in a communication system, in particular an ATM (Asynchronous Transfer Mode) communication system, whereby, given an absence of communication signals, monitoring signals are fed in at the beginning of at least one monitoring path (7, 8) of the communication system, and are coupled out again at the end of the monitoring path (7, 8). According to the invention, the monitoring path (7, 8) is located inside a switching means (1) of the communication system, and, given an absence of all signals at the end of the monitoring path (7, 8), the presence of an error inside the switching means (1) is inferred. In addition, according to the invention a switching means (1) is proposed that comprises a monitoring path (7, 8) at whose beginning a feed-in unit (2) is arranged and at whose end a coupling-out unit (3) is arranged, whereby the coupling-out unit (3) is fashioned such that it recognizes and couples out monitoring signals fed in by the feed-in unit (2). By means of the invention it is in particular possible to trigger an AIS (Alarm Indication Signal) within the shortest time after the determination of an error in the switching means (1).

Figure 1

PCT WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro
INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation 7 : H04Q 11/04 — A1

(11) Internationale Veröffentlichungsnummer: **WO 00/11905**

(43) Internationales Veröffentlichungsdatum: 2. März 2000 (02.03.00)

(21) Internationales Aktenzeichen: PCT/DE99/02390

(22) Internationales Anmeldedatum: 2. August 1999 (02.08.99)

(30) Prioritätsdaten:
198 37 245.0 17. August 1998 (17.08.98) DE

(71) Anmelder *(für alle Bestimmungsstaaten ausser US)*: SIEMENS AKTIENGESELLSCHAFT [DE/DE]; Wittelsbacherplatz 2, D–80333 München (DE).

(72) Erfinder; und
(75) Erfinder/Anmelder *(nur für US)*: SANDER, Horst [DE/DE]; Peissenbergstrasse 19, D–81547 München (DE). STELZL, Rudolf [DE/DE]; Pfarrer Lechner Weg 4, D–85221 Dachau (DE). WALDHAUSER, Richard [DE/DE]; Emmeringer Strasse 7, D–81249 München (DE).

(74) Gemeinsamer Vertreter: SIEMENS AKTIENGESELLSCHAFT; Postfach 22 16 34, D–80506 München (DE).

(81) Bestimmungsstaaten: CA, US, europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

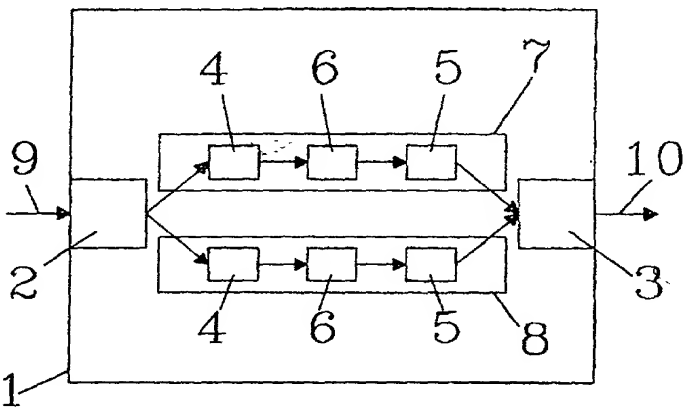
Veröffentlicht
Mit internationalem Recherchenbericht.
Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist; Veröffentlichung wird wiederholt falls Änderungen eintreffen.

(54) Title: ERROR DETECTION IN A COMMUNICATION DEVICE

(54) Bezeichnung: FEHLERFESTSTELLUNG IN EINEM KOMMUNIKATIONSSYSTEM

(57) Abstract

The invention relates to a method for detecting errors in a communication system, especially an ATM communication system (Asynchronous Transfer Mode). In the absence of communication signals, monitoring signals are applied at the beginning of at least one monitoring line (7, 8) of said communication system and then extracted at the end of said monitoring line (7, 8). According to said invention, the monitoring line (7, 8) is located within a communication device (1) of said communication system. The absence of signals at the end of the monitoring line (7, 8) corresponds to the presence of an error in the communication device (1). In addition, a communication device (1) has a monitoring line (7, 8) at the beginning of which a power supply (2) is provided and at the end of which an extraction unit (3) is provided. Said extraction unit is designed for detecting and extracting monitoring signals applied by the power supply (2). The invention makes it possible to trigger an alarm–indicating signal (AIS) very quickly after detection of an error in the communication device (1).



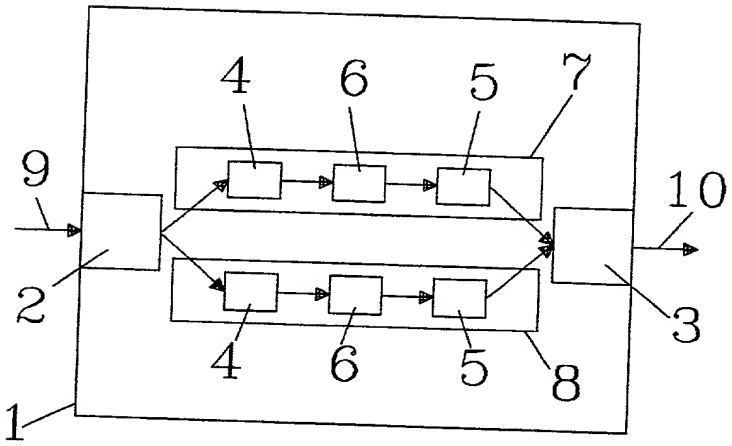


Fig.1

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Fehlerfeststellung in einem Kommunikationssystem

deren Beschreibung

the specification of which

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als PCT internationale Anmeldung PCT Anmeldungsnummer _____ eingereicht wurde und am _____ abgeändert wurde (falls tatsächlich abgeändert).

(check one)

☐ is attached hereto.

☐ was filed on _____ as PCT international application PCT Application No. _____ and was amended on _____ (if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
198 37 245.0	Germany	17. August 1998	☒	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

Telefongespräche bitte richten an: *(Name und Telefonnummer)*

Direct Telephone Calls to: *(name and telephone number)*

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders: SANDER, Horst	Full name of sole or first inventor:
Unterschrift des Erfinders Datum 22.7.99	Inventor's signature Date
Wohnsitz D-81547 München, Germany DEX	Residence
Staatsangehörigkeit Bundesrepublik Deutschland	Citizenship
Postanschrift Peißenbergstr. 19 D-81547 München Bundesrepublik Deutschland	Post Office Addess
Voller Name des zweiten Miterfinders (falls zutreffend): STELZL, Rudolf	Full name of second joint inventor, if any:
Unterschrift des Erfinders Datum 22.7.99	Second Inventor's signature Date
Wohnsitz D-85221 Dachau, Germany DEX	Residence
Staatsangehörigkeit Bundesrepublik Deutschland	Citizenship
Postanschrift Pfarrer Lechner Weg 4 D-85221 Dachau Bundesrepublik Deutschland	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Voller Name des dritten Miterfinders:	Full name of third joint inventor:
WALDHAUSER, Richard	
Unterschrift des Erfinders Datum	Inventor's signature Date
Waldhauser Richard 28.7.99	
Wohnsitz	Residence
D-81249 München, Germany DEX	
Staatsangehörigkeit	Citizenship
Bundesrepublik Deutschland	
Postanschrift	Post Office Address
Emmeringer Str. 7	
D-81249 München Bundesrepublik Deutschland	
Voller Name des vierten Miterfinders (falls zutreffend):	Full name of fourth joint inventor, if any:
Unterschrift des Erfinders Datum	Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address
Voller Name des fünften Miterfinders (falls zutreffend):	Full name of fifth joint inventor, if any:
Unterschrift des Erfinders Datum	Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address
Voller Name des sechsten Miterfinders (falls zutreffend):	Full name of sixth joint inventor, if any:
Unterschrift des Erfinders Datum	Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

"CHANGE OF ADDRESS OF APPLICANTS' REPRESENTATIVE"

APPLICANT: Horst SANDER et al.

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE99/02390

INTERNATIONAL FILING DATE: 2 August 1999

INVENTION: ERROR DETECTION IN A COMMUNICATION DEVICE

Hon. Assistant Commissioner for Patents
Washington, D.C. 20231

SIR:

Members of the firm of Hill & Simpson designated on the original Power of Attorney have merged into the firm of Schiff Hardin & Waite. All future correspondence for the above-referenced application therefore should be sent to the following address:

SCHIFF HARDIN & WAITE
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606

Submitted by,

Steven H. Noll (Reg. 28,982)

Schiff Hardin & Waite
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606
Telephone: 312-258-5790
ATTORNEYS FOR APPLICANT

CUSTOMER NUMBER 26574